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Operations and Maintenance Plan for Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12



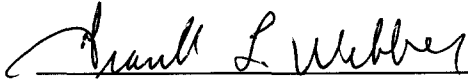
Operations and Maintenance Plan for Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12

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Operations and Maintenance Plan for Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12

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12/19/00

Date

ABSTRACT

This operations and maintenance (O&M) plan describes the long-term operations and maintenance activities that will be conducted at Waste Area Group 5, Operable Unit 5-12, to ensure that the selected remedies identified in the Record of Decision remain protective of human health and the environment. The following 15 sites are discussed further as part of the O&M plan and of the attached institutional control plan:

- Site ARA-01: ARA-I Chemical Evaporation Pond (ARA-01)
- Site ARA-02: ARA-I Sanitary Waste System (ARA-02)
- Site ARA-03: ARA-I Lead Sheetting Pad near ARA-627 (ARA-03)
- Site ARA-06: ARA-II Stationary Low-Power Reactor No. 1 (SL-1) Burial Ground (ARA-06)
- Site ARA-12: ARA-III Radioactive Waste Leach Pond (ARA-12)
- Site ARA-16: ARA-I Radionuclide Tank (ARA-16)
- Site ARA-23: ARA-II Radiologically Contaminated Surface Soils around ARA-I and ARA-II (ARA-23)
- Site ARA-24: ARA-III Windblown Soil (ARA-24)
- Site ARA-25: ARA-I Soils Beneath the ARA-626 Hot Cells (ARA-25)
- Site PBF-10: PBF Reactor Area Evaporation Pond (PBF-10)
- Site PBF-12: PBF SPERT-I Leach Pond (PBF-12)
- Site PBF-13: PBF Reactor Area Rubble Pit (PBF-13)
- Site PBF-21: PBF SPERT-III Leach Pond (PBF-21)
- Site PBF-22: PBF SPERT-IV Leach Pond (PBF-22)
- Site PBF-26: PBF SPERT-IV Lake (PBF-26).

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ACRONYMS

ARA	Auxiliary Reactor Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant(s) of concern
D&D	decontamination and dismantlement
DOE	U.S. Department of Energy
DOE/ID	U.S. Department of Energy Idaho Operations Office
EPA	U.S. Environmental Protection Agency
ICDF	INEEL CERCLA Disposal Facility
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
M&O	management and operations (contractor)
O&M	operations and maintenance
OU	operable unit
PBF	Power Burst Facility
PM	project manager
RD/RA	Remedial Design/Remedial Action
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SL-1	Stationary Low Power Reactor No. 1
SPERT	Special Power Excursion Reactor Test
WAG	waste area group
WERF	Waste Experimental Reduction Facility

Operations and Maintenance Plan for Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12

1. INTRODUCTION

This site specific operations and maintenance (O&M) plan describes the long-term activities and procedures required to satisfy requirements of the Operable Unit (OU) 5-12 Final Record of Decision (ROD) concerning ways to remain protective of human health and the environment at each of the following areas:

- Site ARA-01: ARA-I Chemical Evaporation Pond (ARA-01)
- Site ARA-02: ARA-I Sanitary Waste System (ARA-02)
- Site ARA-03: ARA-I Lead Sheeting Pad near ARA-627 (ARA-03)
- Site ARA-06: ARA-II Stationary Low-Power Reactor No. 1 (SL-1) Burial Ground (ARA-06)
- Site ARA-12: ARA-III Radioactive Waste Leach Pond (ARA-12)
- Site ARA-16: ARA-I Radionuclide Tank (ARA-16)
- ARA-23: ARA-II Radiologically Contaminated Surface Soils around ARA-I and ARA-II (ARA-23)
- Site ARA-24: ARA-III Windblown Soil (ARA-24)
- Site ARA-25: ARA-I Soils Beneath the ARA-626 Hot Cells (ARA-25)
- Site PBF-10: PBF Reactor Area Evaporation Pond (PBF-10)
- Site PBF-12: PBF SPERT-I Leach Pond (PBF-12)
- Site PBF-13: PBF Reactor Area Rubble Pit (PBF-13)
- Site PBF-21: PBF SPERT-III Leach Pond (PBF-21)
- Site PBF-22: PBF SPERT-IV Leach Pond (PBF-22)
- Site PBF-26: PBF SPERT-IV Lake (PBF-26).

This plan outlines the O&M activities that will be conducted and documented in the O&M report at the completion of the remedial action activities required for six of the fifteen sites at OU 5-12: ARA-01, ARA-02, ARA-12, ARA-16, ARA-23, and ARA-25. After remediation actions at these six sites are complete, this O&M plan may be modified based on the results of verification sampling. A seventh site, ARA-06, was identified for remedial action under the ROD for the Stationary Low-Power Reactor-1 and Boiling Water Reactor Experiment-I Burial Grounds (DOE-ID 1996b). Remediation actions have been completed for ARA-06, which now requires O&M activities. This plan also provides details on the remaining eight sites (ARA-03, ARA-24, PBF 10, PBF-12, PBF-13, PBF-21, PBF-22, and PBF-26) that

will not undergo further remedial action and therefore require only the minimal maintenance required for institutional controls. Basic elements of this O&M plan are as follows:

- Section 2—Background on the nature of the contamination at each site and a description of the current controls.
- Section 3—A description of the requirements for institutional controls, environmental monitoring, site specific operations and maintenance, and 5-year reviews.
- Section 4—A description of operations and maintenance implementation including organization, responsibilities and requirements for conducting monitoring, maintenance, inspections, and repairs.
- Section 5—A summary of reporting requirements for institutional controls, environmental monitoring, site specific operations and maintenance, and 5-year reviews.
- Appendix A—The Waste Area Group (WAG) 5 Institutional Control Plan , which documents how the INEEL will comply with the ROD-mandated institutional controls for sites that make up WAG 5, OU 5-12.
- Appendix B—The WAG 5 OU 5-12 Institutional Control Field Inspection Checklist, including the Site Inspection Photo Log¹, both of which are used to record results of annual inspections performed at each of the sites. The checklist may be revised if necessary following Agency review.
- Appendix C—The Institutional Control Monitoring Report Questionnaire, which provides a means to document land-use assumptions, site descriptions, deficiencies, and improvements on an annual basis. This questionnaire may be revised if necessary following Agency review.

Per the Federal Facility Agreement and Consent Order (DOE1991), the Department of Energy (DOE) will prepare and submit an O&M report to the Environmental Protection Agency (EPA) and the Idaho Department of Environmental Quality (IDEQ) at the completion of the O&M activities. This document is to include the following elements:

- Description of O&M activities performed
- Results of site monitoring verifying that the remedy meets the performance criteria
- Explanation of additional O&M (including monitoring) to be undertaken at the site.

¹ Photographs will be used to enhance the informative quality of the comprehensive documentation whenever possible, but particularly when scheduled maintenance activities result in comments by the inspector. A record of these photographs, preserved in the site inspection photo log, will be maintained by the WAG 5 project manager (PM) and made available for review by the DOE-ID, the EPA Region 10, and the IDEQ, herein after referred to as the Agencies.

2. BACKGROUND

2.1 Facility Background

Between the 1950s and 1980s, research activities at the Idaho National Engineering and Environmental Laboratory (INEEL) left behind contaminants that posed risks to human health and the environment. A comprehensive remedial investigation/feasibility study (RI/FS) was performed to determine the nature and extent of the contamination at the ARA/PBF sites. The investigation is detailed in the *Waste Area Group 5, Operable Unit 5-12 Comprehensive Remedial Investigation/Feasibility Study* (Holdren et al. 1999). For an overview of the INEEL, including information about land acquisition and management, information about current and future INEEL programs and projects, planning forecasts for each area of the INEEL (including Auxiliary Reactor Area [ARA] and Power Burst Facility [PBF]), and detailed information about INEEL facilities, refer to the *Idaho National Engineering and Environmental Laboratory Comprehensive Facility and Land Use Plan* accessible through the INEEL Internet home page located at <http://www.inel.gov>.

The ARA and PBF are located fairly close together, as shown in Figure 2-1, and have similar operational backgrounds and sources of contamination. Figures 2-2 and 2-3 delineate the locations of sites requiring institutional controls at ARA and PBF, respectively. Subsequently, ARA and PBF were consolidated into one waste area group, WAG 5, for comprehensive evaluation (DOE-ID 1991).

The ARA consists of four separate operational areas designated as ARA-I, ARA-II, ARA-III, and ARA-IV. Once known as the Special Power Excursion Test (SPERT) facilities, PBF now consists of five separate operational areas: the PBF Control Area, the PBF Reactor Area (SPERT-I), the Waste Engineering Development facility (SPERT-II), the Waste Experimental Reduction Facility (WERF) (SPERT-III), and the Mixed Waste Storage Facility.

Within the ARA and PBF area, fifteen sites will require O&M activities. The sections below provide a historical synopsis of the sites addressed by this O&M plan and Figures 2-4 through 2-18 show each site in its current condition. Detailed descriptions of each site are provided in the ROD (DOE-ID 2000a).

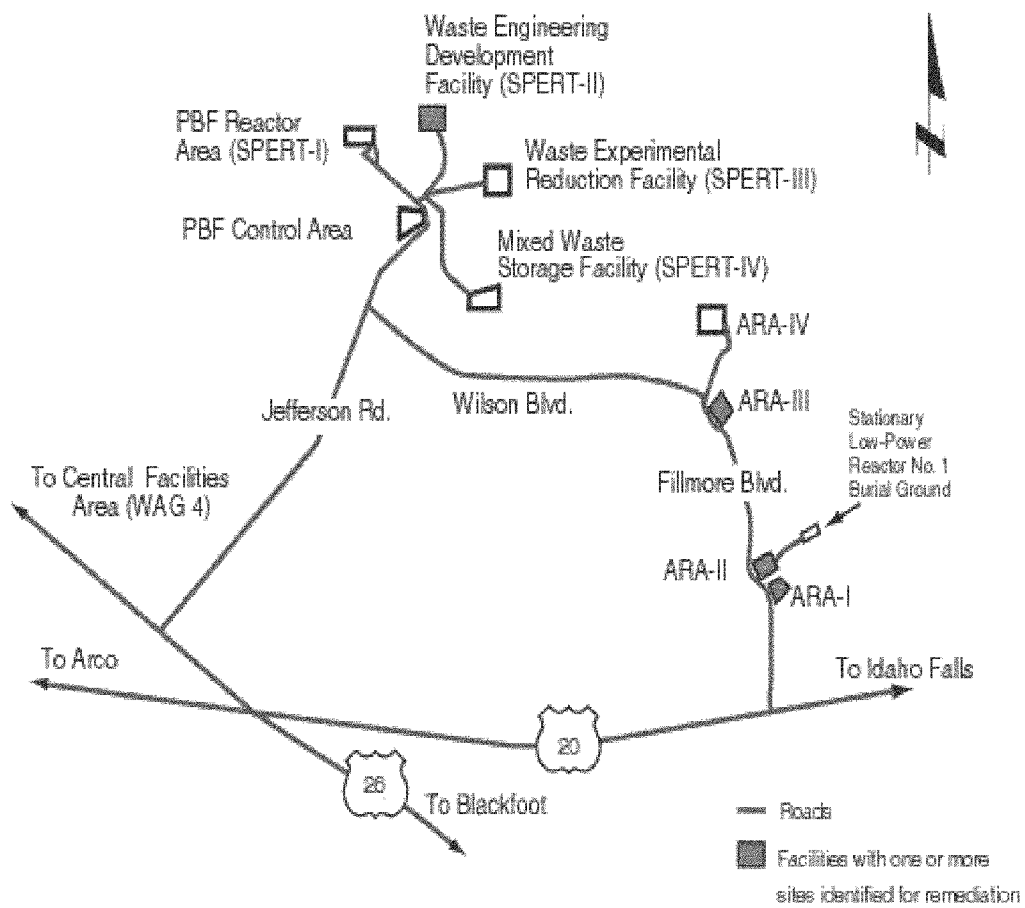


Figure 2-1. Physical Configuration of WAG 5.

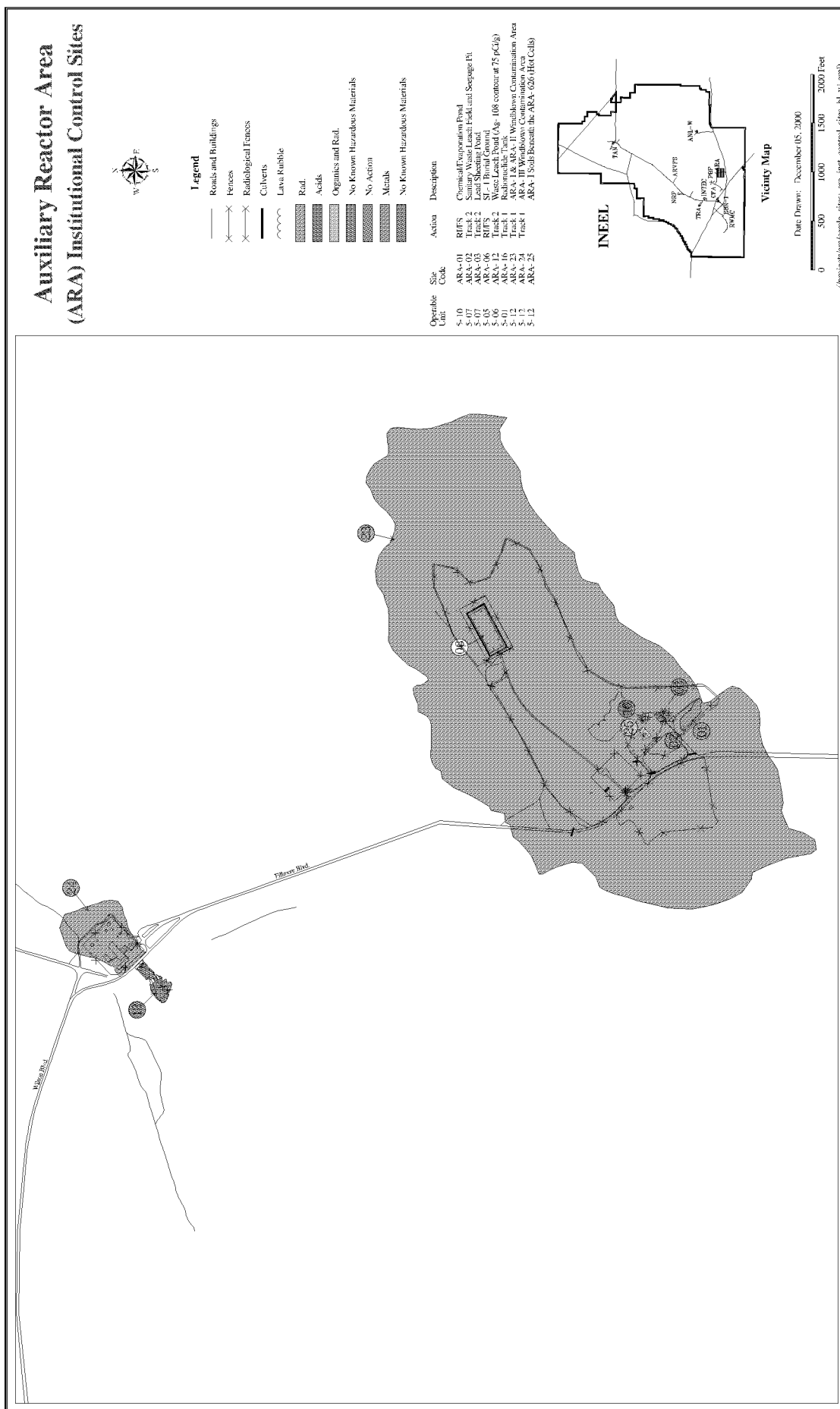
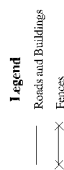

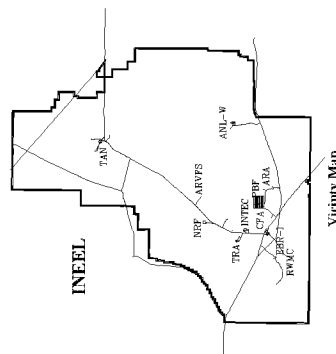


Figure 2-2. Auxiliary Reactor Area Institutional Control Sites.



	No Known Hazardous Materials
	No Action

Operable Unit	Site Code	Action	Description
5-13	PBF-10	Inter. Action	Evaporation Pond
5-12	PBF-12	Track 1	Leach Pond
5-03	PBF-13	Track 1	Rubble Pit
5-02	PBF-21	Track 1	Large Leach Pond
5-09	PBF-22	Track 2	Leach Pond
5-02	PBF-26	Track 1	SPERT Lake



Date Drawn: December 05, 2000





Figure 2-4. ARA-01: ARA-I Chemical Evaporation Pond (Photo File: PN00-301-2-05).

2.1.1 ARA-01: ARA-I Chemical Evaporation Pond

- **History:** The ARA-01 site is a shallow, unlined surface impoundment that was used to dispose of laboratory wastewater from the ARA-I Shop and Maintenance Building.
- **Contaminants of Concern:** Arsenic is identified as a contaminant of concern (COC) based on human health risk estimates.
- **ROD Requirements:** Access to the site will be restricted until remediation is implemented, as prescribed in the ROD, and then the requirements will be re-evaluated. Land-use controls will not be required after remediation if all contaminated soil is removed or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-5. ARA-02: ARA-I Sanitary Waste System (Photo File: PN00-301-2-15).

2.1.2 ARA-02: ARA-I Sanitary Waste System

- **History:** The ARA-02 site, a sanitary septic system comprising three septic tanks in series, a seepage pit, and the associated piping built in 1960, serviced both permanent and temporary ARA-I buildings until ARA-I was inactivated in 1988. This site was remediated during Phase I of the Comprehensive Remedial Design/Remedial Action (RD/RA).
- **Contaminants of Concern:** Cs-137, Ra-226, U-235, U-238, and lead were identified as COCs based on the results of the human health risk assessment.
- **ROD Requirements:** Site access will be restricted until remediation is implemented, as prescribed in the ROD, and then the requirements will be re-evaluated. Land-use controls will not be required after remediation if all contaminated soil is removed or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-6. ARA-03: ARA-I Lead Sheeting Pad Near ARA-627 (Photo File: PN00-301-2-8).

2.1.3 ARA-03: ARA-I Lead Sheeting Pad Near ARA-627

- **History:** The ARA-03 site is a soil area, located east of ARA-I building ARA-627, that was identified as contaminated in 1979. The source of the contamination may have originated from cleanup operations following the 1961 reactor accident at SL-1. Lead sheeting was placed over the site for shielding and was removed in 1991.
- **Contaminant of Concern:** The estimated baseline risk from exposure to Cs-137 for this Track 2 site is $2E-05$ for the 100-year future residential scenario.
- **ROD Requirements:** Site access will be restricted to industrial land use until the restriction is discontinued by the Agencies based on the results of a 5-year review.

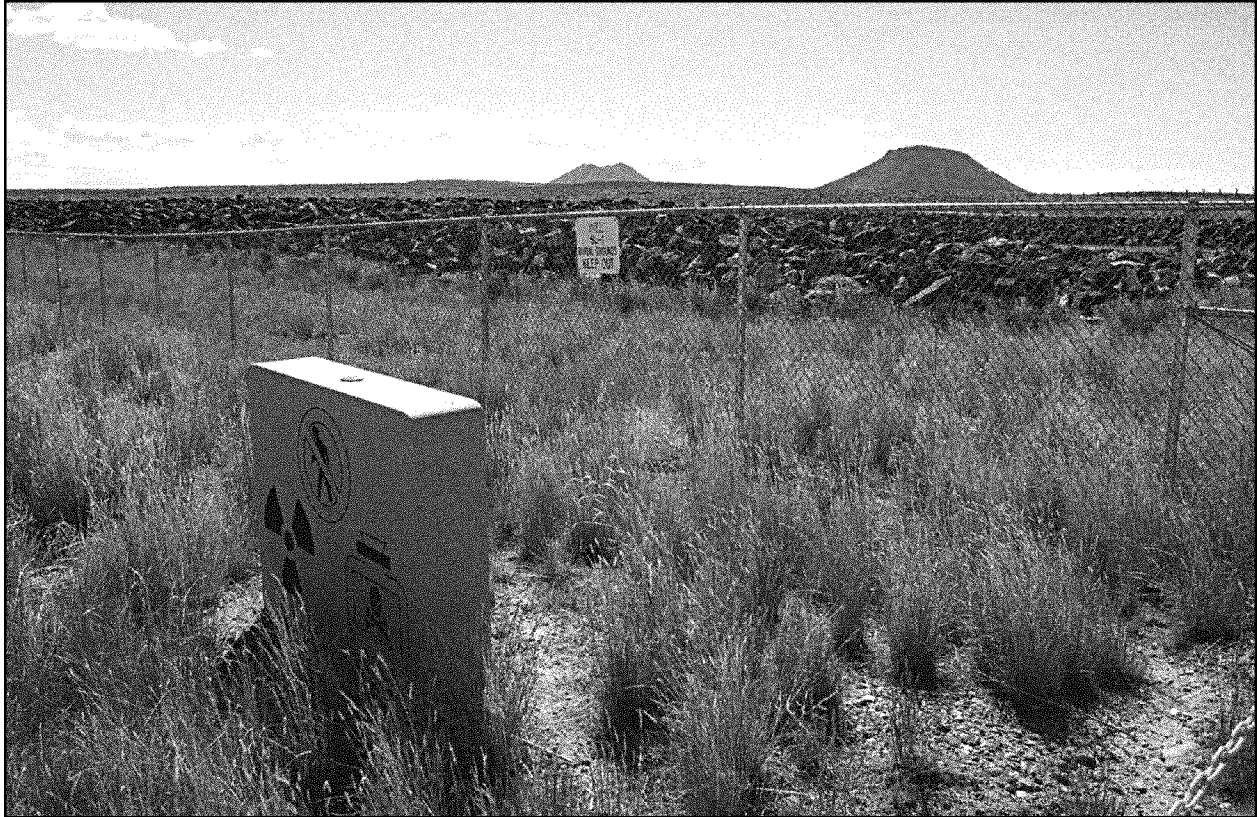


Figure 2-7. ARA-06: ARA-II Stationary Low-Power Reactor No. 1 Burial Ground (Photo File: PN00-301-1-31).

2.1.4 ARA-06: ARA-II Stationary Low-Power Reactor No. 1 Burial Ground

- **History:** The ARA-06 site consists of radioactive debris, soils, and gravel from the 1961 SL-1 reactor accident and cleanup. In 1996, a remedial action consisting of an engineered barrier was implemented at ARA-06.
- **Contaminant of Concern:** This site has an estimated baseline risk of $1\text{E-}01$ for the 100-year future residential scenario diminishing to $1\text{E-}04$ in approximately 400 years from exposure to radiologically contaminated soil and waste.
- **ROD Requirements:** Land-use controls will be maintained to inhibit intrusion into the buried waste. Surface contamination will be addressed by the remediation of ARA-23. Institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review. Recommendations for appropriate land-use restrictions will accompany any land transfer.



Figure 2-8. ARA-12: ARA-III Radioactive Waste Leach Pond (Photo File: PN00-301-1-05).

2.1.5 ARA-12: ARA-III Radioactive Waste Leach Pond

- **History:** The ARA-12 site is an unlined surface impoundment approximately 370 × 150 ft. The pond was constructed in a natural depression west of ARA-III to dispose of low-level liquid waste from reactor research operations.
- **Contaminants of Concern:** Silver-108m (Ag-108m) is identified as the COC for ARA-12 based on human health risk estimates.

- **ROD Requirements:** Site access will be restricted until remediation is implemented, as prescribed in the ROD, and then the requirements will be re-evaluated. Land-use controls will not be required after remediation if all contaminated soil is removed or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-9. ARA-16: ARA-I Radionuclide Tank (Photo File: PN00-301-2-13).

2.1.6 ARA-16: ARA-I Radionuclide Tank

- **History:** The ARA-16 site is a 1,000-gal stainless steel underground holding tank resting within a lidless concrete vault and covered by approximately 3.5 ft of soil. From 1959 to 1988, the tank received radioactive liquid waste. This site was remediated during Phase I of the Comprehensive RD/RA.
- **Contaminants of Concern:** The total estimated risk from exposure to Cs-137 soil around the tank for the 100-year future residential scenario is 1E-04. The contents of the tank are classified as RCRA F-listed mixed waste.
- **ROD Requirements:** Site access will be restricted until remediation is implemented, as prescribed in the ROD, and then the requirements will be re-evaluated. Land-use controls will not be required after remediation if all contaminated soil is removed or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-10. ARA-23: ARA-II Radiologically Contaminated Surface Soils Around ARA-I and ARA-II (Photo File: PN00-301-2-1).

2.1.7 ARA-23: ARA-II Radiologically Contaminated Surface Soils Around ARA-I and ARA-II

- **History:** The ARA-23 site is a 240-acre windblown contamination area surrounding ARA-I and -II and subsurface structures remaining after decontamination and dismantlement (D&D) within the ARA-I and ARA-II facilities. Winds dispersed the contamination over an area roughly 240 acres in size, but soil concentrations over most of the area are less than remediation goals.
- **Contaminant of Concern:** Cs-137 was identified as a COC for ARA-23 based on human health risk estimates.
- **ROD Requirements:** Site access will be restricted until remediation is implemented, as prescribed in the ROD, and then the requirements will be re-evaluated. Land-use controls will not be required after remediation if all contaminated soil is removed or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-11. ARA-24: ARA-III Windblown Soil (Photo File: PN00-301-1-8).

2.1.8 ARA-24: ARA-III Windblown Soil

- **History:** The ARA-24 site consists of the surface soils surrounding the ARA-III facility, as defined by a 1990 aerial survey, excluding Site ARA-12 and including the area within the ARA-III facility fence. Nearly all ARA-III structures have been removed.
- **Contaminant of Concern:** Estimated baseline risks for this site are less than $1\text{E}-06$ for all scenarios. However, a contaminated pipeline embedded in concrete 20 ft below grade remains.
- **ROD Requirements:** Land use will be restricted to prohibit potential exposure to radiologically contaminated material. Institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review. Recommendations for appropriate land-use restrictions will accompany any land transfer.



Figure 2-12. ARA-25: ARA-I Soil Beneath the ARA-626 Hot Cells (Photo File: PN00-301-2-10).

2.1.9 ARA-25 ARA-I Soil Beneath the ARA-626 Hot Cells

- **History:** The ARA-25 site is comprised of contaminated soil that was discovered beneath the ARA-626 Hot Cells during the D&D of the ARA-I facility in 1998. The contamination was found near the hot cell floor drains. This site was remediated during Phase I of the Comprehensive RD/RA.
- **Contaminants of Concern:** Arsenic, lead, Cs-137, and Ra-226 were identified as COCs for ARA-25 based on human health risk estimates.
- **ROD Requirements:** Site access will be restricted until remediation is implemented, as prescribed in the ROD, and then the requirements will be re-evaluated. Land-use controls will not be required after remediation if all contaminated soil is removed or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-13. PBF-10: PBF Reactor Area Evaporation Pond (PBF-733) (Photo File: PN00-301-1-2).

2.1.10 PBF-10: PBF Reactor Area Evaporation Pond (PBF-733)

- **History:** The PBF-10 site was a 19,600 ft² Hypalon-lined surface impoundment used from 1972 to 1984. An interim action was completed in 1994, and the pond liner was removed, the berm was pushed into the pond, and the area was graded and seeded with native grasses in 1995.
- **Contaminant of Concern:** The post-remediation estimated baseline risk from exposure to Cs-137 is 2E-05 for the 100-year future residential scenario.
- **ROD Requirements:** Institutional controls will be maintained until they are discontinued by the Agencies based on the results of a 5-year review.



Figure 2-14. PBF-12: PBF SPERT-I Leach Pond (Photo File: PN00-301-1-4).

2.1.11 PBF-12: PBF SPERT-I Leach Pond

- **History:** The PBF-12 site is the historical location of a 15 × 45-ft diked, unlined surface impoundment originally called the SPERT-I Warm Waste Seepage Pit. The site received radiologically contaminated and nonradioactive overflow from the SPERT-I reactor pit on a sporadic basis from 1955 to 1964. In 1984, D&D was performed at the site. Remediation included removing the drain line and the top 2.5 ft of contaminated soil. The area was mounded slightly with an 8-ft cover of clean soil.
- **Contaminant of Concern:** Risk evaluation for this Track 1 site identified no current occupational risk and a 100-year future residential risk of 2E-05 from exposure to Cs-137.
- **ROD Requirements:** The site will be restricted to industrial land use until the restriction is discontinued by the Agencies based on the results of a 5-year review.



Figure 2-15. PBF-13: PBF Reactor Area Rubble Pit (Photo File: PN00-301-1-8).

2.1.12 PBF-13: PBF Reactor Area Rubble Pit

- **History:** The PBF-13 site is a rubble pit that was first used to dispose of soil and basalt pieces excavated during facility construction in the late 1960s and was later used as a dump for construction materials and piping with asbestos insulation. All visible materials containing asbestos were removed in 1993 and the pit was backfilled with clean soil and basalt rubble.
- **Contaminant of Concern:** Risk evaluation for this site identified no unacceptable risk, but the site contains construction waste, possibly friable asbestos.
- **ROD Requirements:** Land use will be controlled to prohibit potential exposure to friable asbestos. The existing institutional controls will be augmented with signs and maintenance of the existing cover. Institutional controls will be maintained until they are discontinued based on the results of a 5-year review. Recommendations for appropriate land-use restrictions will accompany any land transfer.



Figure 2-16. PBF-21: PBF SPERT-III Large Leach Pond (Photo File: PN00-301-1-12).

2.1.13 PBF-21: PBF SPERT-III Large Leach Pond

- **History:** The PBF-21 site is the historical location of a leach pond that received primary cooling water waste from the sump pump in the SPERT-III Reactor Building from 1958 to 1968. The pond was backfilled by the D&D program.
- **Contaminant of Concern:** Estimated risks from exposure to Cs-137 and U-238 for this site are below $1\text{E-}06$ for the current occupational scenario and are $1\text{E-}05$ for the 100-year future residential scenario. An 8-ft-thick layer of soil covers the contamination.
- **ROD Requirements:** The site will be restricted to industrial land use until the restriction is discontinued by the Agencies based on the results of a 5-year review.



Figure 2-17. PBF-22: PBF SPERT-IV Leach Pond (PBF-758) (Photo File: PN00-301-1-17).

2.1.14 PBF-22: PBF SPERT-IV Leach Pond (PBF-758)

- **History:** The PBF-22 site was an unlined surface impoundment that received effluent from the SPERT-IV reactor from 1961 to 1970.
- **Contaminant of Concern:** Estimated risks from exposure to Cs-137 for this site are $9\text{E-}06$ for the current occupational scenario and $3\text{E-}06$ for exposure to Cs-137 for the 100-year future residential scenario.
- **ROD Requirements:** The site will be restricted to industrial land use until the restriction is discontinued by the Agencies based on the results of a 5-year review.



Figure 2-18. PBF-26: PBF SPERT-IV Lake (Photo File: PN00-301-1-20).

2.1.15 PBF-26: PBF SPERT-IV Lake

- **History:** The PBF-26 site is a large surface impoundment constructed in 1960. From 1961 to 1970, the lake received uncontaminated cooling water from the secondary loop of the SPERT-IV Reactor. From 1971 until 1985, the lake was inactive. From 1985 to 1992, the only discharges to the lake were uncontaminated effluent from Three Mile Island studies and discharges generated by periodic testing of emergency eye wash and shower stations.
- **Contaminant of Concern:** Estimated baseline risks from exposure to arsenic, Aroclor-1254, Cs-137, U-235 and U-238 for this site are $3E-04$ for the 100-year future residential scenario.
- **ROD Requirements:** The site will be restricted to industrial land use until the restriction is discontinued by the Agencies based on the results of a 5-year review.

3. DESCRIPTION OF OPERATIONS AND MAINTENANCE

3.1 Institutional Controls

Institutional controls will be implemented and maintained by the U.S. Department of Energy (DOE) at any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site at the INEEL where residual contamination precludes unrestricted land use. The DOE ensures that administrative and physical institutional controls will be in effect over the next 100 years, unless a 5-year review concludes that unrestricted land use is allowable and institutional controls will no longer be required. After 100 years, DOE may no longer manage the land within the current INEEL boundary; therefore, controls will take the form of land-use restrictions. Though land use after 100 years is uncertain, it is likely that industrial operation will continue at the WAG 5 facilities. Institutional controls will not be required if all contaminated media are removed, if contamination concentrations are comparable to local background values, or if residual concentrations are less than or equal to a 1E-04 risk-based soil concentration for a hypothetical current or future residential or industrial scenario.

All administrative and physical institutional control requirements, including implementation, maintenance, inspection, and reporting are addressed in the WAG 5 “Institutional Control Plan” in Appendix A. Appendix B contains the “Institutional Control Field Inspection Checklist,” and Appendix C contains the “Institutional Control Monitoring Report Questionnaire.”

3.2 Environmental Monitoring

The purpose of environmental monitoring is to ensure that the selected remedy remains protective and achieves the remedial action objectives as outlined in the ROD. Environmental monitoring will be required at all sites that have undergone or are currently undergoing remedial actions. This includes ARA-01, ARA-02, ARA-06, ARA-12, ARA-16, ARA-23, and ARA-25.

Radiological surveys will be conducted annually around the perimeter of ARA-02, ARA-06, ARA-12, ARA-16, ARA-23, and ARA-25. Surveys will also be performed for the non-radiological COCs. Selected sampling may be required prior to releasing any site for unrestricted land use.

Environmental monitoring may be discontinued at any of these sites after a 5-year review if the Agencies decide that monitoring is no longer required. The Agencies may also change the frequency of environmental monitoring in a 5-year review. Surveillance monitoring of the groundwater beneath the ARA and PBF facilities will resume as a component of the selected remedy for WAG 5 specified in the ROD (DOE-ID 2000a). Per the ROD, samples will be collected annually until the first 5-year review, and based on that review the DOE-ID, the EPA, and the IDEQ will determine whether continued groundwater monitoring will be required at WAG 5. Further information on groundwater monitoring is discussed in the “Groundwater Monitoring Plan for Waste Area Group 5 Remedial Action” (DOE-ID 2000b).

3.3 Site Specific Operation and Maintenance

Seven of the sites addressed in this plan have undergone or are currently undergoing remedial actions, and therefore require environmental monitoring (further described in Section 4.2.2) that necessitates specific O&M activities. These sites are described in detail in the following sections. The remaining eight sites, identified in the ROD as requiring only institutional controls, are addressed in the “Institutional Control Plan” presented in Appendix A.

3.3.1 ARA-01: ARA-I Chemical Evaporation Pond

Unacceptable risks to human health and the environment have been identified from contaminated soil on this site. The human health risk associated with ARA-01 is primarily external exposure to heavy metals. Removing all soil that is contaminated with metal concentrations in excess of the remediation goals will mitigate these threats. The remediation of the sites will include removal of soil contaminated with concentrations in excess of the remediation goals using conventional earth-moving equipment (e.g., scrapers and backhoes). Areas that have been excavated to depths greater than 0.3 m (1 ft) may be backfilled with uncontaminated soil or sloped to promote drainage. Contaminated soil will be characterized and sent to the INEEL CERCLA Disposal Facility (ICDF) or another location within the INEEL for permanent disposal.

Existing institutional controls will be maintained until the selected remedy has been implemented. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations are comparable to local background values. Otherwise, post-remediation institutional controls, possibly consisting of signs, access controls, and land-use restrictions, will be established and maintained either until 2095 or sometime before depending on the results of a 5-year review. Intrusion monitoring and subsidence/erosion inspections may be conducted annually, until the first 5-year review by the Agencies. At that time, the decision will be made to either continue or discontinue the monitoring.

3.3.2 ARA-02: ARA-I Sanitary Waste System

The ARA-02 Sanitary Waste System will be remediated to mitigate excess human health risk. Because external exposure to radioactive contaminants is the primary exposure of concern, the entire system (i.e., three septic tanks, a seepage pit, and piping) will be removed. However, the unacceptable health risk is associated only with contaminants in residual dry sludge at the bottom of the seepage pit. The remediation of the Sanitary Waste System includes the sludge in the seepage pit being removed and sent to the INEEL Waste Experimental Reduction Facility (WERF) or an approved off-site facility for batch incineration and final disposition. The components of the Sanitary Waste System (i.e., the seepage pit gravel and cinder blocks, three septic tanks, and pipes) will be excavated and sent to a permitted disposal facility.

The excavated areas will be backfilled, contoured to match the surrounding terrain, and vegetated. Existing institutional controls will be maintained until the selected remedy has been implemented. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations are comparable to local background values. Otherwise, post-remediation institutional controls, possibly consisting of signs, access controls, and land-use restrictions, will be established and maintained either until 2095 or sometime before depending on the results of a 5-year review. Intrusion monitoring and subsidence/erosion inspections may be conducted annually, until the first five-year review by the Agencies is completed. At that time, the decision will be made to either continue or discontinue the monitoring.

3.3.3 ARA-06: ARA-II SL-1 Burial Ground

This site has an estimated baseline risk from exposure to radiologically contaminated soil and waste of $1\text{E-}01$ for the 100-year future residential scenario while diminishing to $1\text{E-}04$ in approximately 400 years. A remedial action consisting of an engineered barrier was implemented to mitigate these risks.

Land-use controls will be maintained to inhibit intrusion into the buried waste. Surface contamination will be addressed by the remediation of ARA-23. Recommendations for appropriate

land-use restrictions will accompany any land transfer. Inspections for intrusion and subsidence/erosion may be conducted annually until the first 5-year review by the Agencies, scheduled for the year 2002, is completed. At that time, the decision will be made to either continue or discontinue the monitoring.

3.3.4 ARA-12: ARA-III Radioactive Waste Leach Pond

Unacceptable risk to human health and the environment has been identified from contaminated soil on this site. The human health risk associated with ARA-12 is primarily external exposure to ionizing radiation. Removing all soil that is contaminated with radiological and metal concentrations in excess of the remediation goals will mitigate these threats. The remediation of the sites will include removal of soil contaminated with concentrations in excess of the remediation goals using conventional earth-moving equipment (e.g., scrapers and backhoes). Areas that have been excavated to depths greater than 0.3 m (1 ft) may be backfilled with uncontaminated soil or sloped to promote drainage. Contaminated soil will be characterized and sent to the ICDF or another location within the INEEL for permanent disposal.

Existing institutional controls will be maintained until the selected remedy has been implemented at four of the five contaminated soil sites. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations are comparable to local background values. Otherwise, post-remediation institutional controls, possibly consisting of signs, access controls, and land-use restrictions, will be established and maintained either until 2095 or sometime before depending on the results of a 5-year review. Intrusion monitoring and subsidence/erosion inspections may be conducted annually until the first five-year review by the Agencies is completed. At that time, the decision will be made to either continue or discontinue the monitoring.

3.3.5 ARA-16: ARA-I Radionuclide Tank

The ARA-16 Radionuclide Tank will be remediated to mitigate excess human health risk from contaminated soil and to prevent a release from the tank that could expose human and ecological receptors to toxic and radioactive contaminants. The contents of the tank pose the only principal threat identified in WAG 5.

Two alternatives have been identified as potential selected remedies for this site. Option 1 entails the removal of the tank and the tank's contents intact, the removal of the sectioned associated piping, and the shipment of these items for off-site ex-situ thermal treatment and disposal. The concrete vault will be excavated and disposed to an approved facility, based on sampling results. Option 2 involves the removal of the tank's contents for shipment to an off-site facility for thermal treatment and disposal, and the excavation and decontamination of the tank and piping prior to their disposal at the Radioactive Waste Management Complex (RWMC). The concrete vault will be excavated and disposed to an approved facility, based on sampling results.

The excavated areas will be backfilled, contoured to match the surrounding terrain, and vegetated. Existing institutional controls will be maintained until the selected remedy has been implemented. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations are comparable to local background values. Otherwise, post-remediation institutional controls, possibly consisting of signs, access controls, and land-use restrictions, will be established and maintained either until 2095 or sometime before depending on the results of a 5-year review. Intrusion monitoring and subsidence/erosion inspections may be conducted annually until the first five-year review by the Agencies is completed. At that time, the decision will be made to either continue or discontinue the monitoring.

3.3.6 ARA-23: ARA-II Radiologically Contaminated Surface Soils

Unacceptable risk to human health has been identified from contaminated soil and remaining concrete from D&D activities on this site. The human health risk associated with ARA-23 is primarily external exposure to CS-137. Removing all soil that is contaminated with concentrations in excess of the remediation goals will mitigate these threats. The remediation of the sites will include removal of soil contaminated with concentrations in excess of the remediation goals using conventional earth-moving equipment (e.g., scrapers and backhoes). Areas that have been excavated to depths greater than 0.3 m (1 ft) may be backfilled with uncontaminated soil or sloped to promote drainage. Contaminated soil will be characterized and sent to the ICDF or another location within the INEEL for permanent disposal.

Existing institutional controls will be maintained until the selected remedy has been implemented. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations are comparable to local background values. Otherwise, post-remediation institutional controls, possibly consisting of signs, access controls, and land-use restrictions, will be established and maintained either until 2095 or sometime before depending on the results of a 5-year review. Intrusion monitoring and subsidence/erosion inspections may be conducted annually until the first 5-year review by the Agencies is completed. At that time, the decision will be made to either continue or discontinue the monitoring.

3.3.7 ARA-25: ARA-I Soils Beneath the ARA-626 Hot Cells

Unacceptable risk to human health and the environment has been identified from contaminated soil on this site. The human health risk associated with ARA-25 is primarily external exposure to arsenic, lead, Cs-137, and Ra-226. Removing all soil that is contaminated with radiological and metal concentrations in excess of the remediation goals will mitigate these threats. The remediation of the sites will include removal of soil contaminated with concentrations in excess of the remediation goals using conventional earth-moving equipment (e.g., scrapers and backhoes). Areas that have been excavated to depths greater than 0.3 m (1 ft) may be backfilled with uncontaminated soil or sloped to promote drainage. Contaminated soil will be characterized and sent to the ICDF or another location within the INEEL for permanent disposal.

Existing institutional controls will be maintained until the selected remedy has been implemented at four of the five contaminated soil sites. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations are comparable to local background values. Otherwise, post-remediation institutional controls, possibly consisting of signs, access controls, and land-use restrictions, will be established and maintained either until 2095 or sometime before depending on the results of a 5-year review. Intrusion monitoring and subsidence/erosion inspections may be conducted annually until the first five-year review by the Agencies is completed. At that time, the decision will be made to either continue or discontinue the monitoring.

3.4 Five Year Reviews

Five-year reviews will be conducted to evaluate the effectiveness of the remedies at those sites with risks remaining above 1E-04. Five-year reviews will not be required at sites that are available for unrestricted land use after the completion of a remedial action. The 5-year reviews will determine whether the selected remedy for each site remains protective and will assess the need for additional institutional controls or environmental monitoring. The 5-year reviews will be conducted until risk is less than or equal to 1E-04, as documented in a 5-year review.

The first review will be conducted within 5 years of the start of remedial action construction at OU 5-12, and subsequent 5-year reviews will be completed within 5 years of the previous 5-year review. After 5 years, the decision will be made by the Agencies to either continue or discontinue the O&M activities for a given site.

4. OPERATIONS AND MAINTENANCE IMPLEMENTATION

This section summarizes the activities needed to implement the O&M requirements. These activities include monitoring, inspection, maintenance and repairs, outlining the organizational practices that will drive the O&M activities and specifying the individuals responsible for performing the activities required for OU 5-12. As described in Section 3, there are no planned operations or schedule maintenance activities. However, based on inspections performed in support of maintaining institutional controls and remedial action sites, it may be necessary to perform unscheduled maintenance and repairs.

4.1 Organization and Responsibilities

4.1.1 DOE Project Manager

The DOE-ID WAG 5 remediation project manager (PM) is responsible for the following:

- Ensuring the O&M activities are performed in accordance with this approved plan
- Coordinating the activities of the INEEL Management and Operations (M&O) Contractor at WAG 5, OU 5-12.

4.1.2 INEEL M&O Contractor

As the point of contact for O&M activities, the INEEL M&O Contractor WAG 5 remediation PM will be responsible for the following:

- Document control of inspection reports, including their placement in the project records file
- Administration of subcontracts for performing required repairs
- Reporting of activities to DOE-ID.

4.2 Conducting Monitoring, Maintenance, Inspections, and Repairs

The WAG 5 M&O Contractor will provide qualified personnel to perform the O&M activities for the remedial actions under the OU 5-12 ROD. Personnel will be trained on the requirements of the approved plan prior to performing O&M activities. The INEEL M&O Contractor WAG 5 PM is responsible for the implementation and reporting of inspections.

Annual inspections will be performed for the first 5 years. After 5 years O&M activities, including inspection and reporting, will be discontinued unless required by the Agencies. If necessary, reviews of the inspection plan and procedures will be performed every 5 years for 100 years, unless suspended earlier. An Inspection Report Form and associated Site Inspection Photo Number Log are included in Appendix B.

4.2.1 Institutional Controls

Requirements and frequency for institutional control inspection and maintenance are addressed in the WAG-5 “Institutional Control Plan” in Appendix A. The inspections will address institutional control requirements for each site such as identification and warning signs, visible access restrictions, administrative controls, and land-use restrictions.

4.2.2 Environmental Monitoring

No environmental monitoring will be performed for the eight sites identified in the ROD as requiring only institutional controls, such as maintenance of signs, monument markers, and fencing. Those eight sites are therefore addressed in the “Institutional Control Plan” presented in Appendix A. For the seven sites specified in section 3.2, environmental monitoring will be performed as specified in Table 4-1. As noted, monitoring will be performed annually for each site until the first 5-year review, after which 5-year reviews for 100 years will be performed unless determined otherwise by the Agencies. The types of monitoring requirements include:

- Radiological Survey—This includes conducting a radiological survey of site soils with field screening methods
- Heavy Metal Survey—This includes using conventional sampling methods and equipment or field screening to determine the presence or absence of heavy metals. Heavy metal surveys will not be required if verification sampling confirms that all contamination has been removed.

Table 4-1. Summary of the OU 5-12 Environmental Monitoring Requirements.

Site	Monitoring Requirement ^a	Review Period ^b
ARA-01: ARA-I Chemical Evaporation Pond	Heavy Metal Survey	5-year reviews for 100 years
ARA-02: ARA-I Sanitary Waste System	Radiological Survey of site perimeter	5-year reviews for 100 years
ARA-06: ARA-II SL-1 Burial Ground	Radiological Survey of site perimeter	5-year reviews for 100 years
ARA-12: ARA-III Radioactive Waste Leach Pond	Radiological Survey of site perimeter; Heavy Metal Survey of site soils	5-year reviews for 100 years
ARA-16: ARA-I Radionuclide Tank	Radiological Survey of site perimeter	5-year reviews for 100 years
ARA-23: ARA-II Radiologically contaminated Surface Soils	Radiological Survey of site perimeter	5-year reviews for 100 years
ARA-25: ARA-I Soils Beneath the ARA-626 Hot Cells	Radiological Survey of site perimeter; Heavy Metal Survey of site soils	5-year reviews for 100 years

a. Annually until the first five-year review, after which the Agencies may revise the frequency.

b. Review periods may be revised by the Agencies based on the results of five-year reviews.

4.2.3 Operations and Maintenance

Inspection of the WAG 5, OU 5-12 sites specified in section 3.3 will be performed. Inspections of the sites will generally fall into three types:

- Annual scheduled inspections
- Follow-up inspections
- Contingency inspections.

No routine maintenance is planned for the sites. Maintenance and repair of soil cover will be performed as necessary based on the inspection results. Follow-up inspections will be performed to verify adequacy of maintenance and repairs.

Contingency inspections are unscheduled inspections ordered by DOE-ID. Events that may trigger contingency inspections may include severe rainstorms, floods, or highly unusual events such as tornadoes or earthquakes.

The waste sites described in Section 3 that will undergo remediation include ARA-01, ARA-02, ARA-06, ARA-12, ARA-16, ARA-23, and ARA-25. Where backfilling of the excavated area is required, annual inspection of the backfilled areas will be required for evidence of:

- Intrusion
- Subsidence
- Erosion.

Additionally, the condition of the cover vegetation will be evaluated when applicable.

5. REPORTING REQUIREMENTS

Reporting requirements related to institutional controls, environmental monitoring, operations and maintenance, and 5-year reviews are summarized in the following sections. The purpose of this reporting is to ensure that all activities are adequately documented and that related data and information is provided to the Agencies for review and decision making. Although the following sections indicate separate reporting requirements and separate reports, the reporting requirements may be met by combining the information into a single annual report. The frequency of all of the reporting identified in the following sections will be reviewed by the Agencies during the first 5-year review and may be adjusted to an alternate frequency. All reports will be submitted electronically to the INEEL Information Repository for records storage.

5.1 Institutional Control Reporting

Reporting requirements for institutional controls are specified in the WAG 5 “Institutional Control Plan” in Appendix A. An institutional control monitoring report will be prepared and submitted to the Agencies for information on an annual basis throughout the duration of a site’s O&M activities.

5.2 Environmental Monitoring Reporting

Data and results from annual environmental monitoring activities will be compiled and addressed in an annual environmental monitoring report. This annual report will be prepared and submitted to the Agencies for information.

5.3 Operations and Maintenance Reporting

Data and results from annual O&M activities, including inspections, maintenance, and repairs will be compiled and addressed in an annual report of operations and maintenance. This annual report will be prepared and submitted to the Agencies for information. The report will contain documentation of scheduled inspections, follow-up and contingency inspections, and maintenance activities. It will include:

- General OU description and operational history
- A summary of the inspection
- A summary of maintenance activities to date
- An estimate of maintenance activities required in the next year
- An assessment of cover inspection data and applicable photos
- A copy of the appropriate inspection report forms.

5.4 Five Year Review Reporting

Data and results from the annual reports for institutional controls, environmental monitoring, and operations and maintenance will be summarized and addressed in a 5-year review report. Additional content requirements for the report will be developed and included in the next revision to this O&M plan.

6. REFERENCES

- DOE-ID, January 2000a, *Record of Decision for the Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12*, DOE/ID-10700, U.S. Department of Energy, Idaho Operations Office.
- DOE-ID, August 2000b, *Groundwater Monitoring Plan for Waste Area Group 5 Remedial Action*, DOE/ID-10779, U.S. Department of Energy, Idaho Operations Office.
- DOE-ID, January 1996b, *Record of Decision: Stationary Low-Power Reactor-1 and Boiling Water Reactor Experiment-I Burial Grounds (Operable Units 5-01, 5-03, 5-04, and 5-11)*, U.S. Department of Energy, Idaho Operations Office; U.S. Environmental Protection Agency, Region 10, and Idaho Department of Health and Welfare.
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